Stoller
Grand Junction Office established 1959

299-W22-28 (A4969)
Log Data Report

Borehole Information:

Borehole:	299-W22-28 (A4969)		Site:	West of 216-U-12 Crib	
Coordinates (WA St Plane)		GWL[1] (ft):	None	GWL Date:	07/25/03
North (m)	East (m)	Drill Date	Ground Level Elevation	Total Depth (ft)	Type
134465.777	567433.699	02/64	693.02 ft	300.0	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.85	8 5/8	8.0	5/16	+2.85	300.0

Borehole Notes:

The logging engineer measured the casing stickup using a steel tape. A caliper was used to measure the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape, rounded to the nearest 1/16 in.; casing thickness was calculated. Ledgerwood (1993) reported total depth at 300 ft; however, total logging depth was 230 ft. There is no documentation available regarding a borehole obstruction at 230 ft. Groundwater was measured at this depth in 1964. Ledgerwood (1993) reported the casing was perforated from 215 to 297 ft. The logging engineer attempted to measure depth to water and the borehole was dry at 230 ft. Coordinates and top of casing (TOC) elevation are derived from HWIS[2]. Logging data acquisition is referenced to the TOC.

Logging Equipment Information:

Logging System:	Gamma 1E		Type:	SGLS (70%) SN: 34TP40587A
Calibration Date:	07/03	Calibration Reference:	GJO-2003-468-TAR	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	3		
Date	07/25/03	07/28/03	07/28/03		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	230.0	80.0	55.0		
Finish Depth (ft)	56.0	56.0	3.0		
Count Time (sec)	100	100	100		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A[3]	N/A	N/A		
Pre-Verification	AE006CAB	AE007CAB	AE007CAB		

Log Run	1	2 Repeat	3		
Start File	AE006000	AE007000	AE007025		
Finish File	AE006174	AE007024	AE007077		
Post-Verification	AE006CAA	AE007CAA	AE007CAA		
Depth Return Error (in.)	0	N/A	0		
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

Logging Operation Notes:

Spectral gamma logging was performed in this borehole on July 25 and 28, 2003. Logging was conducted with a centralizer on the sonde and measurements are referenced to top of casing. A repeat section was collected in this borehole to evaluate system performance.

Analysis Notes:

Analyst:	Henwood	Date:	07/29/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met.

A casing correction for 0. 3125-in.-thick casing was applied throughout the borehole.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1EJul03.xls using an efficiency function and corrections for casing and dead time as determined from annual calibrations. Dead time and water corrections were not necessary.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclides (^{137}Cs and ^{60}Co) detected in the borehole, naturally occurring radionuclides (^{40}K, ^{238}U, ^{232}Th [KUT]), a combination of man-made, KUT, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. A repeat log section is also included. In addition, a comparison plot of RLS spectral gamma data collected in 1995 by Westinghouse Hanford Co. and the current SGLS data is presented.

Results and Interpretations:

^{137}Cs and ^{60}Co were the only man-made radionuclides detected in this borehole. ^{137}Cs was detected at the ground surface at approximately 1.5 pCi/g. ^{60}Co was detected at the bottom of the borehole at concentrations of approximately 0.1 pCi/g.

The comparison plot of the RLS and SGLS data shows ^{137}Cs and ^{60}Co contamination at similar depths and concentrations (RLS concentrations are decayed to the date of the SGLS logging). The total depth of logging was 9.0 ft greater for the RLS than the SGLS. ^{60}Co was detected by the RLS to the total depth of 239 ft. It is likely the total depth of contamination has not been penetrated by the logging systems. On the basis of the RLS ^{60}Co contamination profile between 225 and 229 ft, where no ^{60}Co is detected by the SGLS, downward movement of contamination may have occurred since 1995.

There are notable changes in the KUT and total gamma logs. An interval between 185 and 200 ft indicates relatively low ^{40}K and ^{232}Th concentrations. The driller's log refers to this interval as a "yellow clay." The early Palouse soil (155 to 187 ft) is identified by a 0.3-pCi/g increase in the ^{232}Th concentration and a 75-cps increase in total gamma count rate.

The repeat sections indicated good agreement of the naturally occurring KUT.

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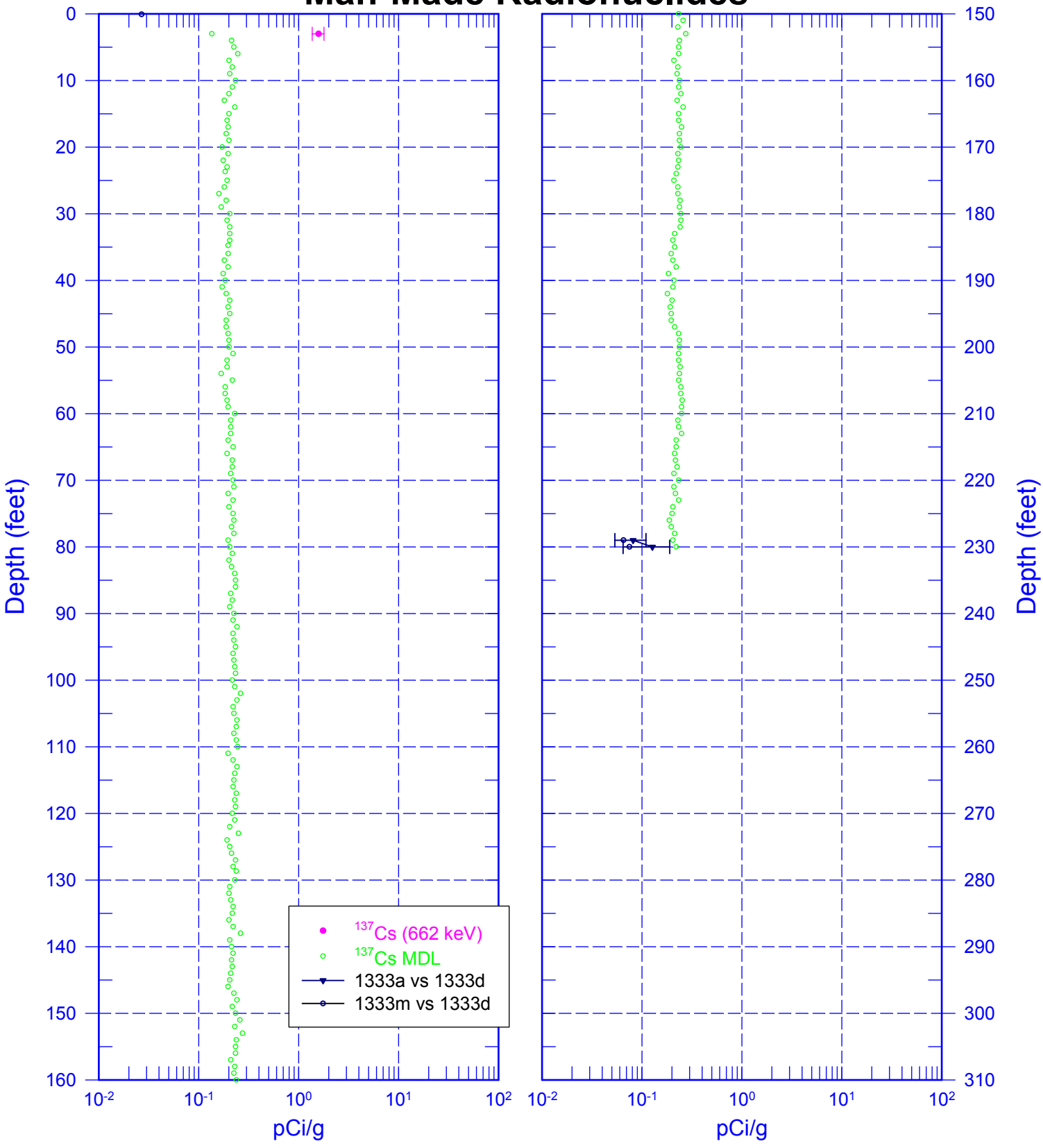
[1] GWL – groundwater level
[2] HWIS – Hanford Well Information System
[3] N/A – not applicable

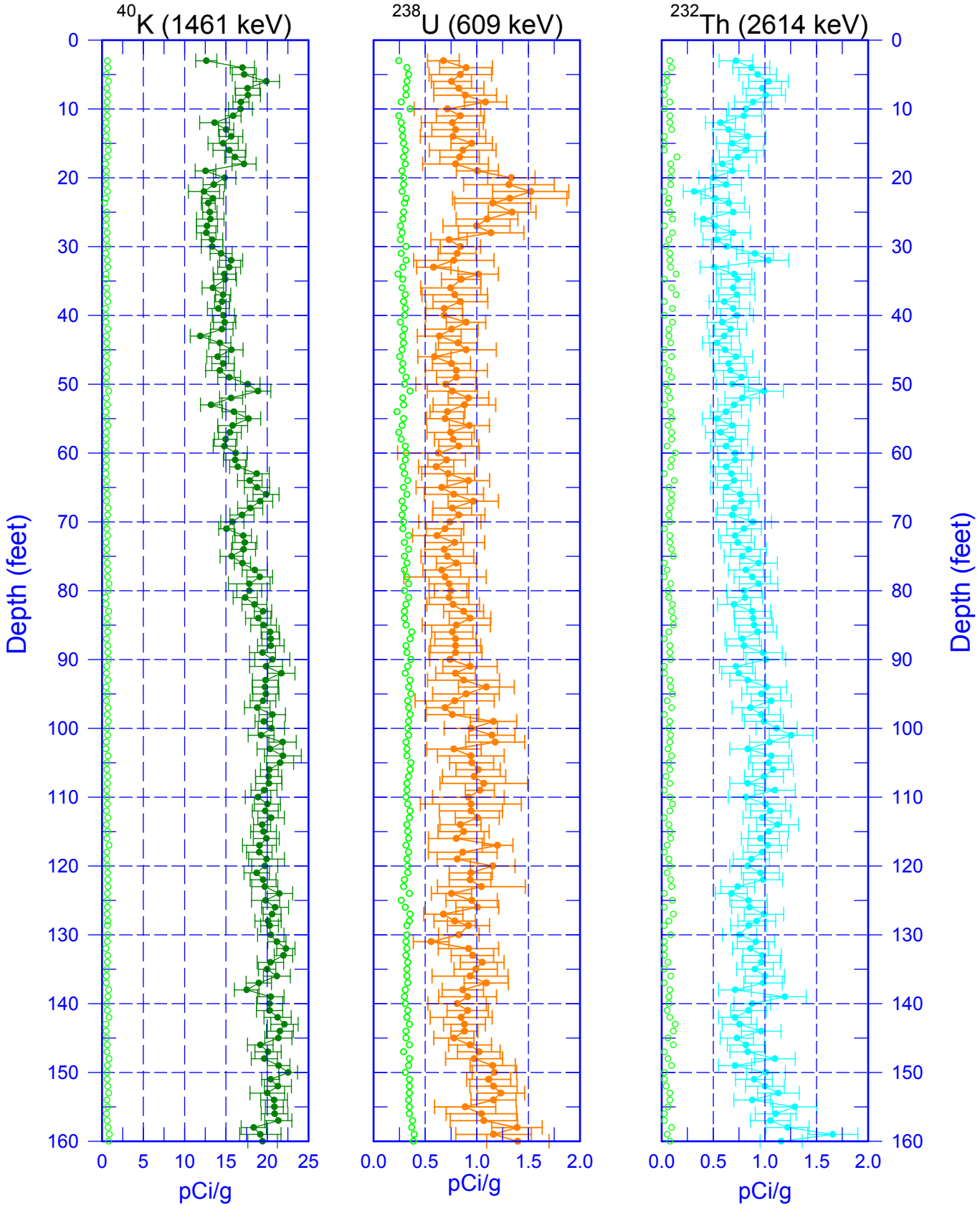
299-W22-28 (A4969)
Man-Made Radionuclides



Zero Reference - Top of Casing

Last Log Date - 07/28/03

299-W22-28 (A4969)
Natural Gamma Logs

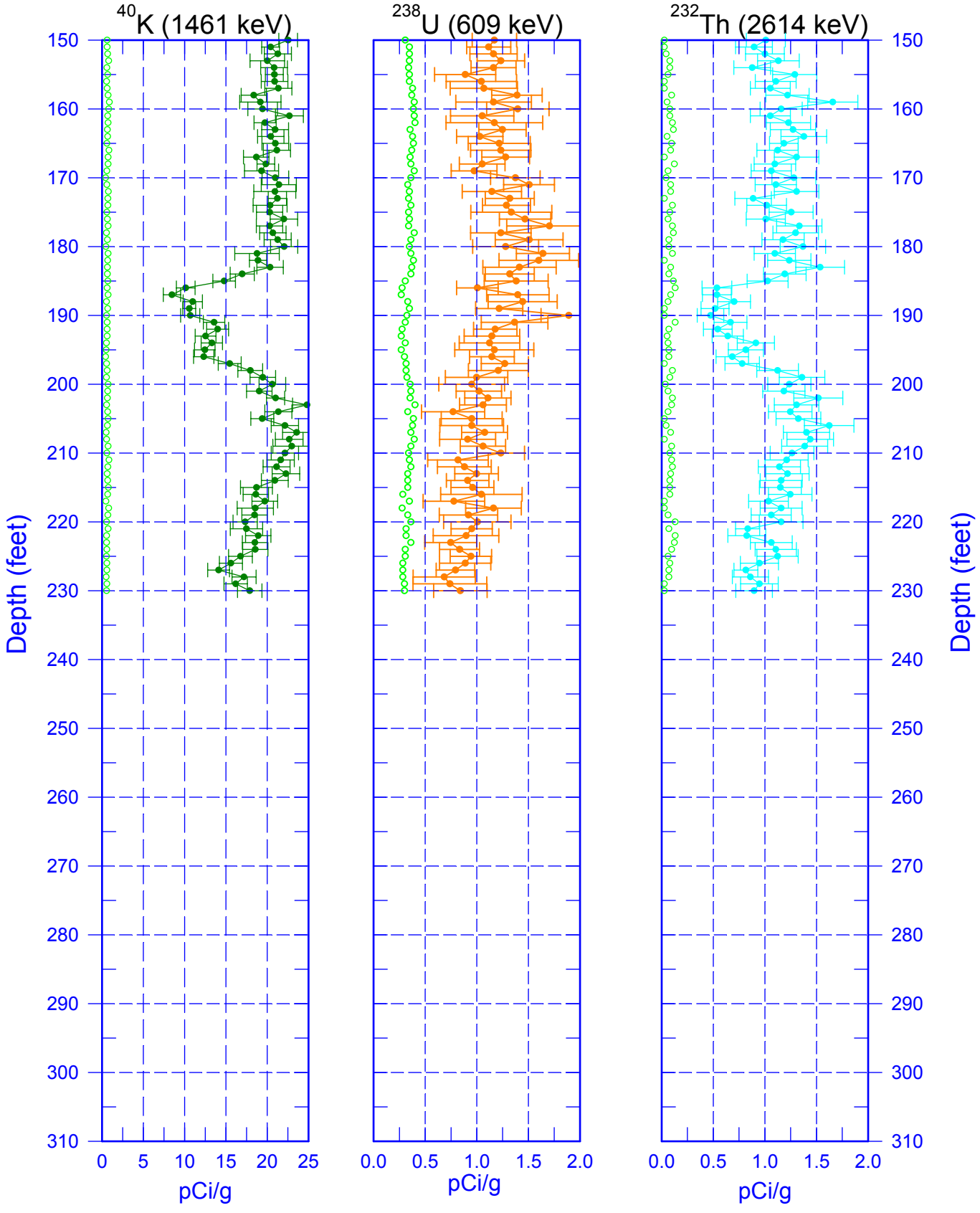


Zero Reference = Top of Casing

MDL

Last Log Date - 07/28/03

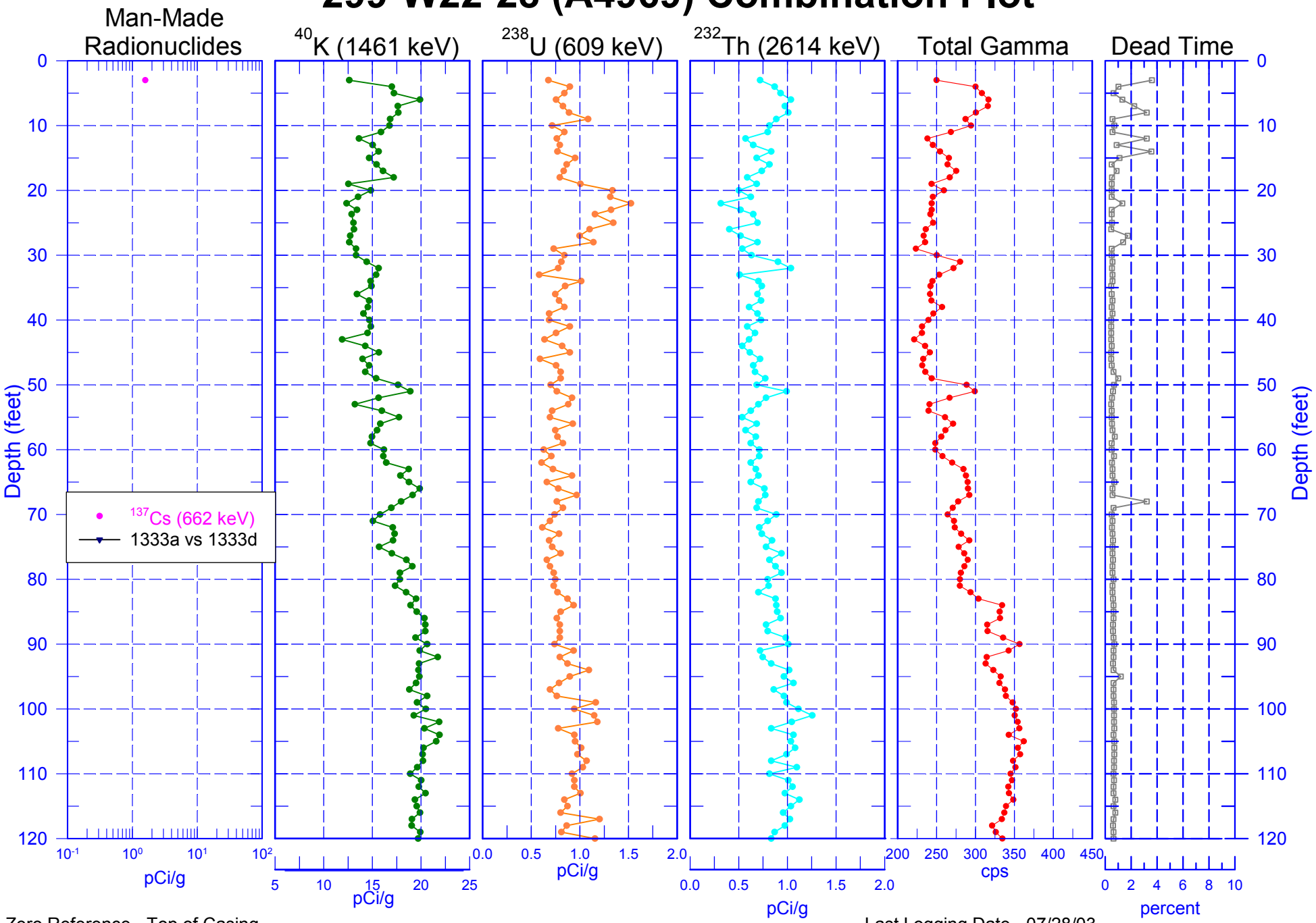
299-W22-28 (A4969)
Natural Gamma Logs



Zero Reference - Top of Casing

Last Log Date - 07/28/03

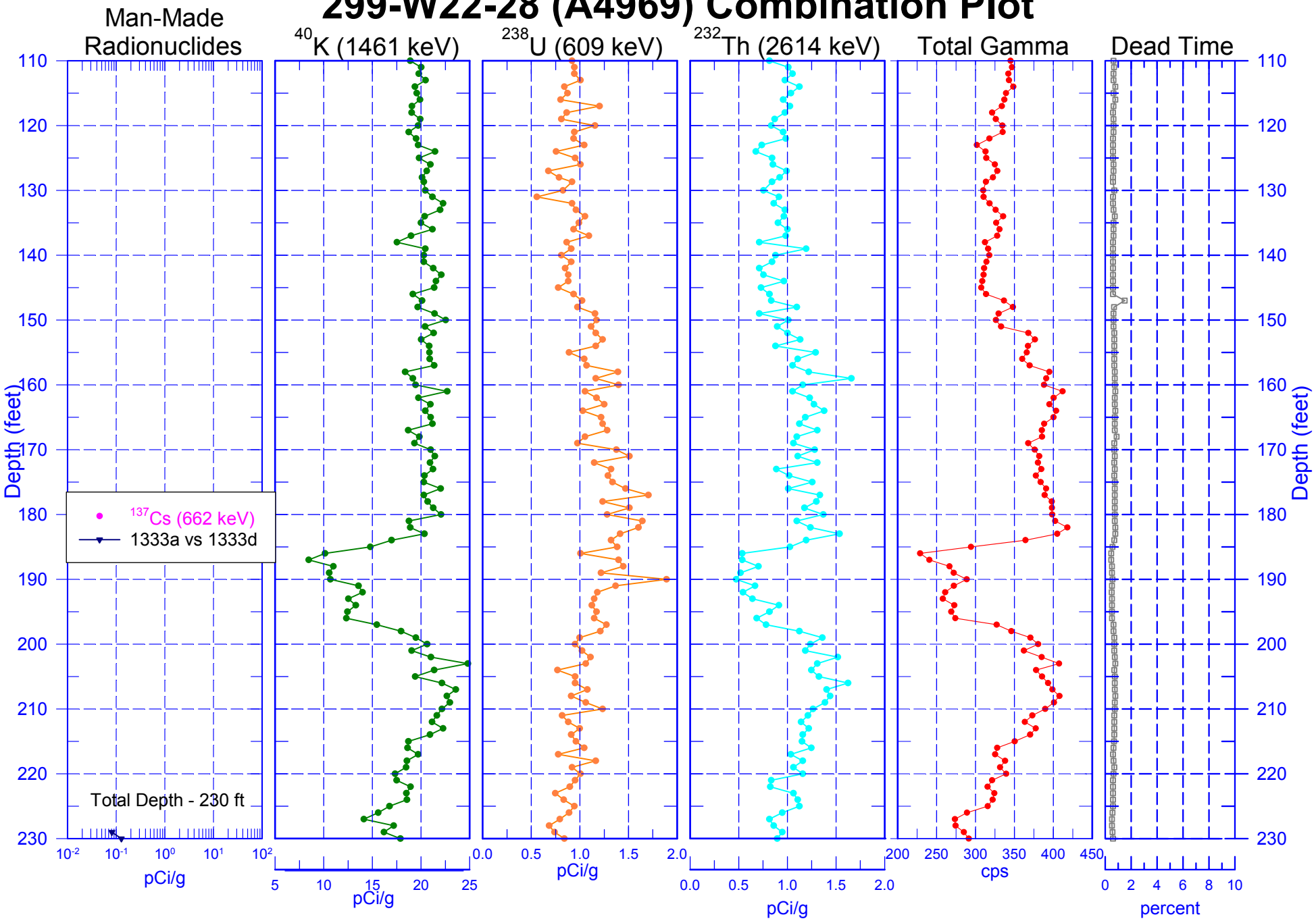
299-W22-28 (A4969) Combination Plot



Zero Reference - Top of Casing

Last Logging Date - 07/28/03

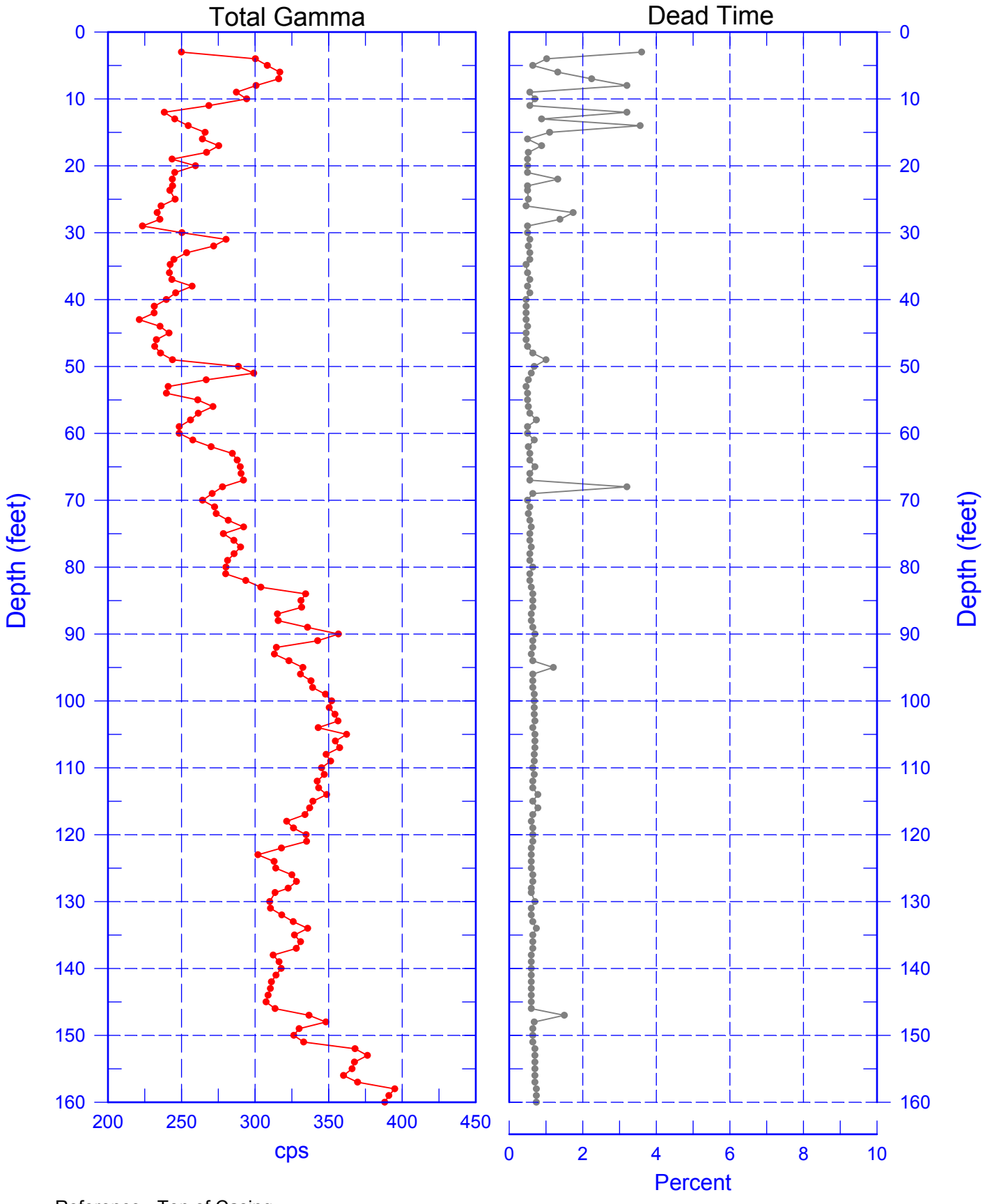
299-W22-28 (A4969) Combination Plot



Zero Reference - Top of Casing

Last Logging Date - 07/28/03

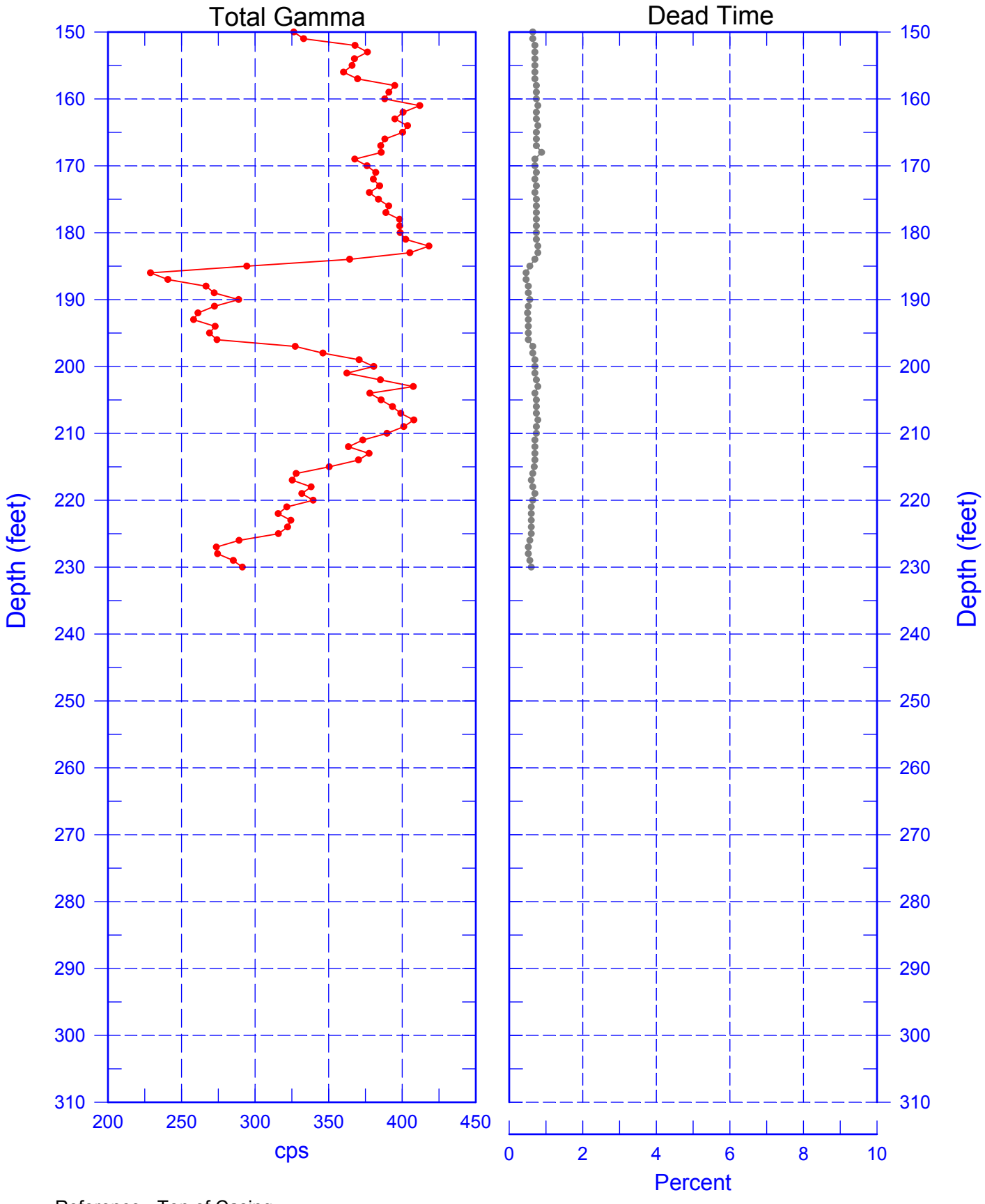
299-W22-28 (A4969)
Total Gamma & Dead Time



Reference - Top of Casing

Last Log Date - 07/28/03

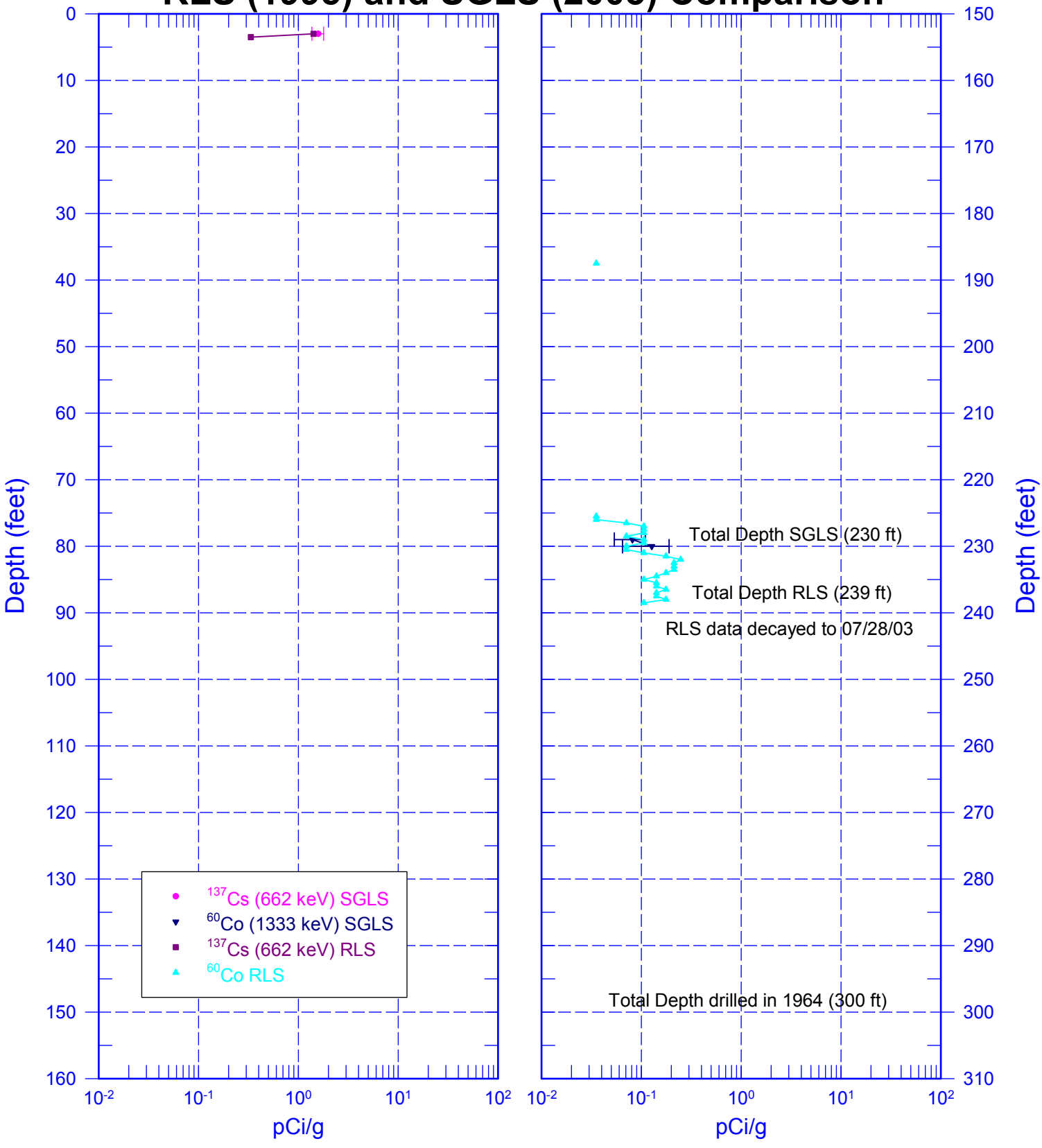
299-W22-28 (A4969)
Total Gamma & Dead Time



Reference - Top of Casing

Last Log Date - 07/28/03

299-W22-28 (A4969)
RLS (1995) and SGLS (2003) Comparison



Zero Reference - Top of Casing

Last Log Date - 07/28/03